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Zhen

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(54) **SWITCH ASSEMBLY AND ELECTRICAL DEVICE USING SAME**

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H01H 3/12 (2006.01)

(52) **U.S. Cl.** **200/341**

(58) **Field of Classification Search** ..... 200/341–345, 200/525, 437, 453, 457, 510–517, 520, 521, 200/314, 5 A
See application file for complete search history.

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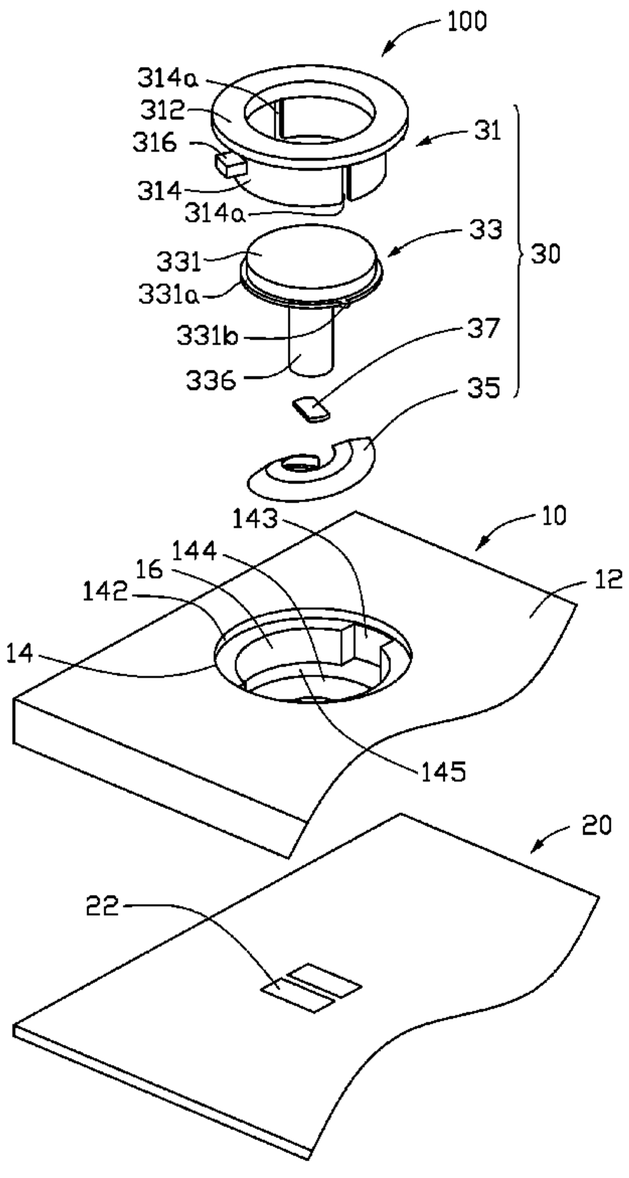
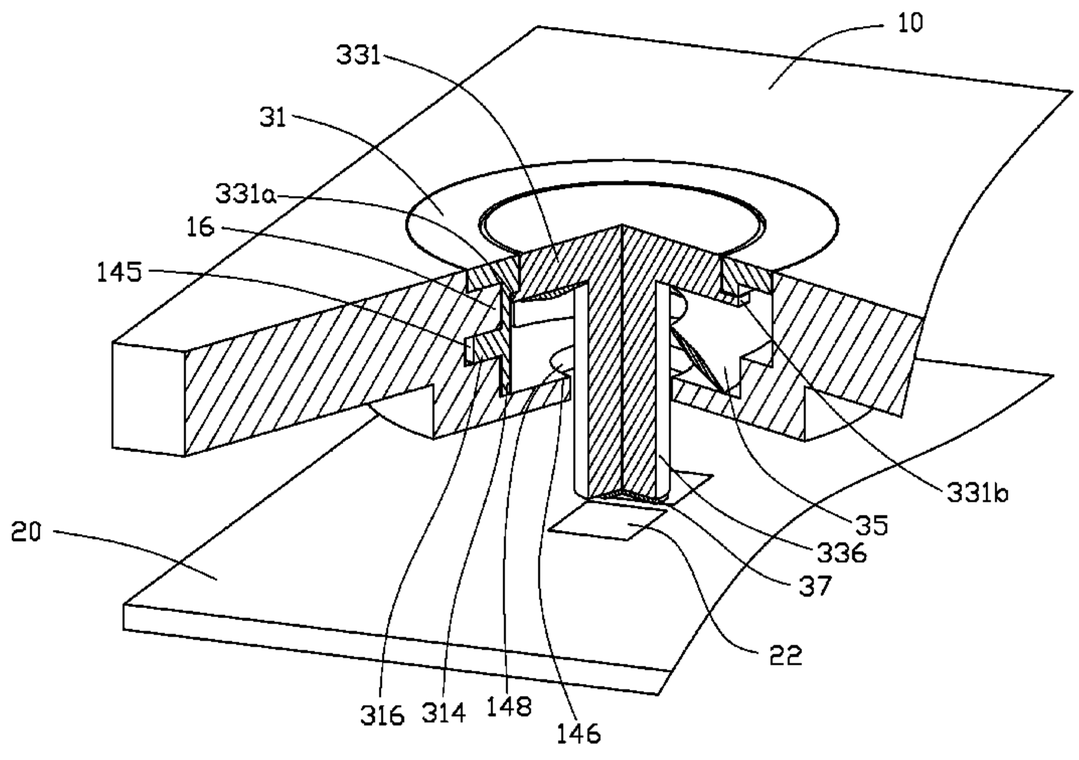
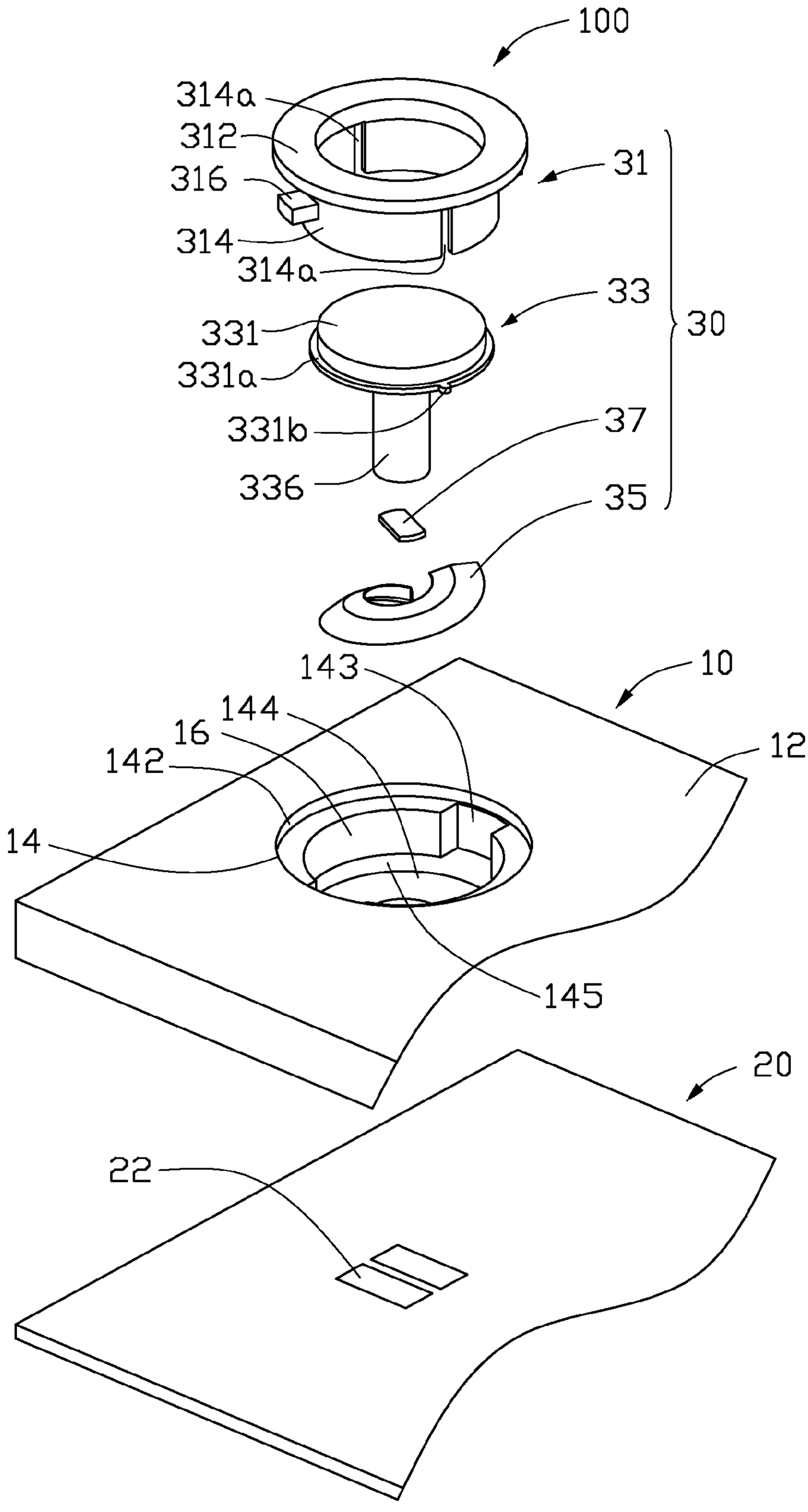
(57) **ABSTRACT**

A switch assembly includes a shell, and a push button including a fixing member, a pushing member, an elastic member and an electrical-conductive member. A shell includes an upper surface and a cavity extending from the upper surface to a lower surface opposite to the upper surface. The fixing member is received in the cavity of the shell. The pushing member is slidably received in the fixing member and exposed out of the cavity. The elastic member is positioned between the pushing member and the shell. The electrical-conductive member is mounted on an end of the pushing member.

20 Claims, 2 Drawing Sheets






100
314a
312
316
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314a
31
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331
331a
331b
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22

FIG. 1

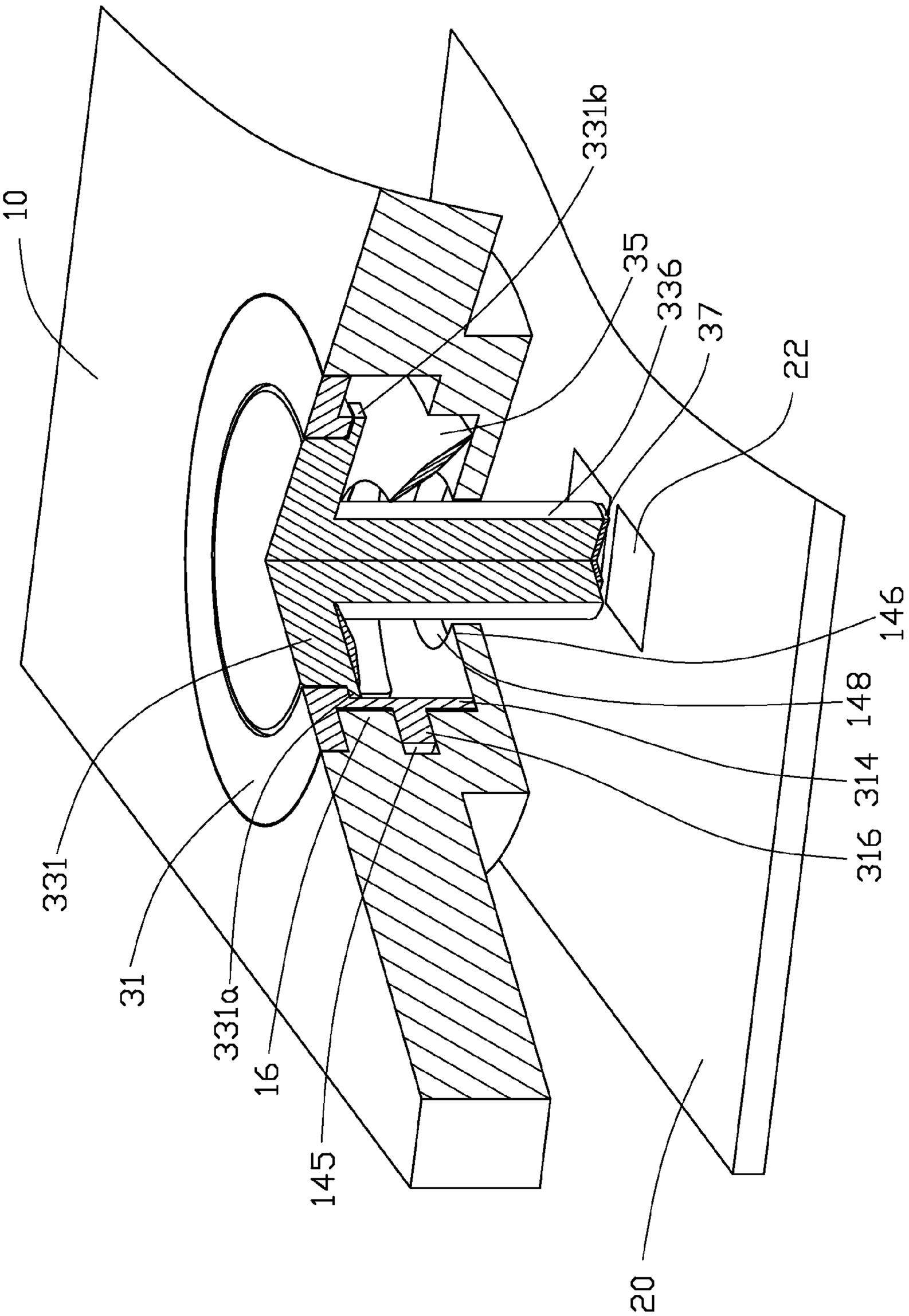

FIG. 2

SWITCH ASSEMBLY AND ELECTRICAL DEVICE USING SAME

BACKGROUND

1. Technical Field

The disclosure relates to switch assemblies, and more particularly, to a compact switch assembly with small scale and an electrical device using the same.

2. Description of Related Art

A push button or a simply switch assembly is provided for controlling some aspect of a machine or a process. Most traditional push buttons are designed with a pair of restoring arms or elastic arms for restoring the push button to its normal position after being pushed. However, the restoring arms or elastic arms take up a large space such that the push button is bulky. Thus, the present configuration of the push button is adverse to be used in an electronic device that follows the trend of miniaturization.

Therefore, it is desirable to provide a switch assembly and an electrical device using the switch assembly to eliminate or at least alleviate the above problem.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. **1** is an isometric, exploded view of an electrical device according to an exemplary embodiment.

FIG. **2** is an isometric, cross section view of the electrical device of FIG. **1**.

DETAILED DESCRIPTION

Referring to FIGS. **1-2**, an electrical device **100** according to an exemplary embodiment of the present invention, includes a shell **10**, a circuit board **20** received in the shell **10**, and a push button **30** mounted on the shell **10** for turning on or off certain circuits of the circuit board **20**. The shell **10** and the bush button **30** cooperatively form a switch assembly that is used for controlling some aspect of the circuits formed on the circuit board **20**.

The shell **10** defines an upper surface **12**, and a cavity **14** extending from the upper surface **12** toward a lower surface opposite to the upper surface **12**. The cavity **14** defines a circumference side **142** and a bottom **146** connected to the circumference side **142**. The circumference side **142** has a round step **144** extending inwardly along the circumferential direction of the circumference side **142**. The bottom **146** defines a through hole **148** running through the center thereof. The shell **10** further includes a pair of curved protrusions **16** evenly formed on the circumference side **142**. The pair of the curved protrusions **16** is parallel to the step **144** of the circumference side **142** and away from the step **144** at a certain distance. Thereby, a pair of passages **143** is formed between the pair of protrusions **16**, and a channel **145** is formed between the protrusions **16** and the step **144** to communicate with the passages **143**.

The circuit board **20** is engaged with the shell **10** and includes a pair of electrical contacts **22** formed thereon. The electrical contacts **22** are aligned to the through hole **148** of the shell **10** when the circuit board **20** is assembled with the switch assembly. It is to be noted that, the pair of electrical contacts **22** is disconnected and can be electrically connected to each other by the push button **30**.

The push button **30** is positioned in the cavity **14** and passes the through hole **148** of the shell **10**. The push button **30** includes a fixing member **31**, a pushing member **33**, an elastic member **35** and an electrical-conductive member **37**. The pushing member **33** is slidably received in the fixing member **31**. The elastic member **35** is positioned between the pushing member **33** and the bottom **146** of the cavity **14**. The electrical-conductive member **37** is mounted on an end of the pushing member **33**.

The fixing member **31** defines a top ring **312** engaged with the protrusions **16** of the shell **10**, a bushing **314** extending downward from a bottom of the top ring **312** and coaxial with the top ring **312**, and at least a pair of blocks **316** symmetrically extending outward from an outer surface of the bushing **314** along a circumferential direction. The bushing **314** of the fixing member **31** is attached on the bottom **146** of the cavity **14** when the push button **30** is received in the cavity **14** of the shell **10**. The bushing **314** defines a pair of slots **314***a* extending through an inner surface and an outer surface along a center axis direction of the bushing **314**. The bushing **314** has an inner diameter bigger than the diameter of the inner-circumference of the top ring **312**, and the bushing **314** therefore can receive the pushing member **33** to prevent the pushing member **33** from disengaging with the fixing member **31**. The blocks **316** are inserted into the channel **145** through the passages **143** and then offset from the position aligned with the passages **143**.

The pushing member **33** includes a keycap **331**, and a push rod **336**. The keycap **331** is slidably received in the bushing **314** of the fixing member **31**. The push rod **336** extends downward from a bottom of the keycap **331**. The keycap **331** includes a flange **331***a* protruding outwards from an outer surface of the keycap, and a pair of slide projections **331***b* symmetrically received in the corresponding slots **314***a* of the bushing **314** and formed on the flange **331***a*. The diameter of the keycap **331** is smaller than the diameter of the inner-circumference of the top ring **312**. Thus, when the keycap **331** is assembled with the fixing member **31**, the keycap **331** can pass through the top ring **312** when pushed. The flange **331***a* has an outer diameter larger than the diameter of the inner-circumference of the top ring **312** so that the pushing member **33** is limited between the fixing member **31** and the shell **10**. The push rod **336** extends downwards from the bottom of the keycap **331** and passes through the through hole **148** of the bottom **146** to align with the electrical contacts **22** of the circuit board **20**.

The elastic member **35** is sleeved on the push rod **336** and may be resiliently compressed between the bottom **146** of the shell **10** and the keycap **331** of the pushing member **30** when pushing the keycap **331** towards the through hole **148** of the shell **10**. The elastic member **35** may be a spiral spring or a helical leaf spring.

The electrical-conductive member **37** is mounted on the distal end of the push rod **336** away from the keycap **331** and can electrically connect the electrical contacts **22** of the circuit board **20** when the keycap **331** is pressed. Alternatively, the electrical-conductive member **37** can be a metal piece or a conductive adhesive coated on the distal end of the push rod **336**.

In present invention, the fixing member **31** is employed to fix the pushing member **33**, and the elastic member **37** is employed to provide a restoring force to return the pushing member **33** to a normal position. Therefore, the elastic arms or restoring members used in the prior art is omitted and the switch assembly is compact and miniaturized.

It is believed that the present embodiments and their advantages will be understood from the foregoing description, and it will be apparent that various changes may be made thereto without departing from the spirit and scope of the disclosure or sacrificing all of its material advantages, the examples hereinbefore described merely being preferred or exemplary embodiments of the disclosure.

What is claimed is:

1. A switch assembly comprising:

a shell comprising an upper surface and a cavity extending from the upper surface to a lower surface opposite to the upper surface, the cavity defining a circumference side comprising a round step formed thereon; and

a push button positioned through the cavity of the shell and comprising:

a fixing member received in the cavity and supported on the step of the shell;

a pushing member slidably received in the fixing member and exposed out of the cavity;

an elastic member positioned between the pushing member and the shell; and

an electrical-conductive member mounted on an end of the pushing member.

2. The switch assembly as claimed in claim **1**, wherein the cavity further defines a bottom connected on the circumference side; the bottom defines a through hole running through a center thereof; the shell further comprises as pair of curved protrusions evenly formed on the circumference side; the protrusions are parallel to the step and apart from the step by a certain distance; and the elastic member is positioned between the pushing member and the bottom of the cavity.

3. The switch assembly as claimed in claim **2**, wherein the curved protrusions define a pair of passages there-between and a channel between the curved protrusions and the step to communicate with the passages.

4. The switch assembly as claimed in claim **3**, wherein the fixing member defines a top ring engaged with the protrusions of the shell, a bushing extending downward from a bottom of the top ring and attached on the bottom of the cavity, and at least a pair of blocks symmetrically extending outward from the outer surface of the bushing along the circumferential direction and inset in the channel of the shell.

5. The switch assembly as claimed in claim **4**, wherein an inner diameter of the bushing is bigger than that of the top ring so that the bushing can receive the pushing member therein, and the top ring can therefore prevent the pushing, member from disengaging with the fixing member.

6. The switch assembly as claimed in claim **5**, wherein the pushing member comprises a keycap slidably received in the bushing of the fixing member, and a push rod extending downwards from a bottom of the keycap and extending out from the through hole of the bottom of the shell.

7. The switch assembly as claimed in claim **6**, wherein the keycap comprises a flange protruding outwards from an outer surface thereof along the circumferential direction; an outer diameter of the keycap is smaller than the diameter of the inner-circumference of the top ring, the keycap can therefore expose out from the top ring; and an outer diameter of the flange is bigger than the diameter of the inner-circumference of the top ring to prevent the pushing member from breaking away from the fixing member.

8. The switch assembly as claimed in claim **7**, wherein the bushing defines a pair of slots extending through an inner and an outer surfaces thereof along the axis direction of the bushing; and the flange of the keycap defines a pair of slide projections symmetrically formed thereon which are received in the slots of the bushing correspondingly.

9. The switch assembly as claimed in claim **6**, wherein the elastic member is sleeved on the push rod and is resiliently compressed between the bottom of the shell and the keycap of the pushing member when pushing the keycap towards the through hole of the shell.

10. The switch assembly as claimed in claim **1**, wherein the elastic member is selected from spiral spring or a helical leaf spring.

11. An electrical device comprising:

a shell comprising an upper surface and a cavity extending from the upper surface to a lower surface opposite to the upper surface, the cavity defining a circumference side comprising a round step formed thereon;

a circuit board engaged with the shell and comprising at least one pair of disconnected electronic contacts formed thereon corresponding to the cavity; and

a push button positioned through the cavity of the shell and comprising:

a fixing timber received in the cavity and supported on the step of the shell;

a pushing member slidably received in the fixing member and extending out from the cavity to align with the contacts of the circuit board;

an elastic member positioned between the pushing member and the shell; and

an electrical-conductive member mounted on an end of the pushing member and configured for electrically connecting the at least one pair of contacts of the circuit board when the pushing member of the push button is pressed.

12. The electrical device as claimed in claim **11**, wherein the cavity further defines a bottom connected on the circumference side; the bottom defines a through hole running through a center thereof; the shell further comprises a pair of curved protrusions evenly formed on the circumference side; the protrusions are parallel to the step and apart from the step by a certain distance; and the elastic member is positioned between the pushing member and the bottom of the cavity.

13. The electrical device as claimed in claim **12**, wherein the curved protrusions define a pair of passages there-between and a channel formed between the curved protrusions and the step to communicate with the passages.

14. The electrical device as claimed in claim **13**, wherein the fixing member defines a top ring engaged with the protrusions of the shell, a bushing extending downward from a bottom of the top ring and attached on the bottom of the cavity, and at least a pair of blocks symmetrically extending outward from the outer surface of the bushing along, the circumferential direction and inset in the channel of the shell.

15. The electrical device as claimed in claim **14**, wherein an inner diameter of the bushing is bigger than that of the top ring so that the bushing can receive the pushing member therein, and the to ring can therefore prevent the pushing member from disengaging with the fixing member.

16. The electrical device as claimed in claim **15**, wherein the pushing member comprises a keycap slidably received in the bushing of the fixing member, and a push rod extending downward from a bottom of the keycap and extending out from the through hole of the bottom of the shell.

17. The electrical device as claimed in claim **16**, wherein the keycap comprises a flange protruding outwards from an outer surface thereof along the circumferential direction; an outer diameter of keycap is smaller than the diameter of the inner-circumference of the top ring, the keycap can therefore expose out from the top ring; and an outer diameter of the flange is bigger than the diameter of the inner-circumference of the top ring to prevent the pushing member from breaking away from the fixing member.

18. The electrical device as claimed in claim **17**, wherein the bushing defines a pair of slots extending through an inner and an outer surfaces thereof along the axis direction of the bushing; and the flange of the keycap defines a pair of slide projections symmetrically formed thereon which are received in the slots of the bushing correspondingly.

19. The electrical device as claimed in claim **16**, wherein the elastic member is sleeved on the push rod and is resiliently compressed between the bottom of the shell and the keycap of the pushing member when pushing the keycap towards the through hole of the shell.

20. The electrical device as claimed in claim **11**, wherein the elastic member is selected from spiral spring or a helical leaf spring.

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